

CLAIMS

We claim:

1. A method for providing a reductant to an engine exhaust stream of a vehicle, the method comprising:

placing a mixture into a fuel tank of the vehicle, the mixture comprising fuel normally used by the engine of the vehicle and a liquid reductant which is compatible with the fuel but of higher volatility than the fuel;

recovering vaporized reductant emitted by the liquid reductant and storing the vaporized reductant in a storage device; and

selectively injecting the reductant into the exhaust stream.

2. The method of Claim 1, wherein the vaporized reductant is recovered directly from the fuel tank.

3. The method of Claim 1, wherein the vaporized reductant is recovered by passing the mixture through a heat exchanger.

4. A method for regeneration of a nitrous oxide adsorber in a Diesel engine exhaust treatment system, the method comprising:

fueling the engine from a fuel tank of the vehicle containing a mixture of Diesel oil and an alcohol;

recovering vaporized alcohol and storing the vaporized alcohol in a storage device; and

initiating regeneration by injecting alcohol in the storage device into an exhaust stream upstream of the adsorber, whereby the alcohol thermally decomposes to produce sufficient hydrogen and carbon monoxide to regenerate the adsorber.

5. The method of Claim 4, wherein the alcohol comprises methanol.

6. The method of Claim 4, wherein the alcohol comprises ethanol.

7. The method of Claim 4, further comprising monitoring the exhaust stream at an output of the adsorber and initiating regeneration whenever a level of nitrous oxide exceeds a predetermined threshold value.

8. The method of Claim 4, further comprising:
monitoring oxygen content of the exhaust stream at an output of the adsorber
and determining an amount of alcohol vapor to be injected in accordance with the
oxygen content.

9. The method of Claim 8, wherein the amount of alcohol vapor is
determined by controlling flow rate of injected alcohol vapor to the exhaust
stream.

10. The method of Claim 4, wherein the storage device comprises a
charcoal canister.

11. The method of Claim 4, wherein vaporized alcohol is recovered
directly from the fuel tank.

12. The method of Claim 4, wherein vaporized alcohol is recovered by
passing the mixture of Diesel oil and alcohol through a heat exchanger.

13. The method of Claim 4, wherein alcohol from the storage device is
injected in vapor form into the exhaust stream.

14. The method of Claim 4, wherein alcohol from the storage device is
injected in liquid form into the exhaust stream.

15. The method of Claim 4, wherein alcohol from the storage device is injected in both vapor and liquid form into the exhaust stream.

16. An arrangement for providing a reductant to an engine exhaust stream of a vehicle, the arrangement comprising:

a fuel tank containing a mixture of fuel normally used by the engine of the vehicle and a liquid reductant which is compatible with the fuel but of higher volatility than the fuel;

a storage device coupled for receipt of reductant vapor derived from the mixture; and

an injection conduit coupling the storage device to the engine exhaust stream.

17. The arrangement of Claim 16, further comprising a vapor conduit having a first end located in the fuel tank above a liquid level of the mixture and a second end coupled to the storage device.

18. The arrangement of Claim 16, further comprising a heat exchanger coupled to a fuel line extending between the engine and the fuel tank, the heat exchanger operative to vaporize at least a portion of the liquid reductant in the mixture, and a vapor conduit coupled between the heat exchanger and the storage device.

19. An arrangement for effecting regeneration of a nitrous oxide adsorber in a Diesel engine exhaust treatment system, the arrangement comprising:

a fuel tank containing a fuel mixture of Diesel oil and an alcohol;

a storage device coupled for receipt of alcohol vapor derived from the mixture; and

an alcohol injection conduit coupling the storage device to an engine exhaust stream at an inlet to the nitrous oxide adsorber.

20. The arrangement of Claim 19, further comprising a pump coupled to the storage device and operative to drive alcohol out of the storage device into the injection conduit.

21. The arrangement of Claim 20, further comprising a metering valve located in the injection conduit and operative to control flow rate therethrough.

22. The arrangement of Claim 21, further comprising an engine control unit coupled to the metering valve and the pump for selective operation thereof.

23. The arrangement of Claim 22, further comprising a nitrous oxide sensor positioned in the engine exhaust stream at an output of the nitrous oxide adsorber and having an output coupled to the engine control unit, the engine

control unit operative to actuate the pump to deliver alcohol to the exhaust stream whenever a level of nitrous oxide detected by the nitrous oxide sensor exceeds a predetermined threshold value.

24. The arrangement of Claim 22, further comprising an oxygen sensor positioned in the engine exhaust stream at an output of the nitrous oxide adsorber and having an output coupled to the engine control unit, the engine control unit operative to adjust the metering valve in accordance with a level of oxygen detected by the oxygen sensor.

25. The arrangement of Claim 19, further comprising a vapor conduit having a first end located in the fuel tank above a liquid level therein and a second end coupled to the storage device.

26. The arrangement of Claim 19, further comprising a heat exchanger coupled to a fuel line extending between the Diesel engine and the fuel tank, the heat exchanger operative to vaporize at least a portion of the alcohol in the fuel mixture, and a vapor conduit coupled between the heat exchanger and the storage device.

27. The arrangement of Claim 19, wherein the alcohol comprises methanol.

28. The arrangement of Claim 19, wherein the alcohol comprises ethanol.

29. The arrangement of Claim 19, wherein the storage device comprises a charcoal canister.